

In re: Sung-Yung Lee, et al.
Application Serial No.: 10/650,344
Filed: August 28, 2003
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REMARKS

This amendment is submitted in reply to the Official Action mailed August 11, 2005 ("the Action"). Claims 1-3, 5-20, 33-38, 44 and 45 are pending in the application.

I. Allowed Claims

Applicant acknowledges, with appreciation, the Examiner's statement that Claims 10-20, 33, 34, 35, 38, 44 and 45 are allowed.

II. The §102(b) Rejections

The Action rejects Claims 1-3 and 5-9 as being anticipated by U.S. Patent No. 5,459,345 to Okudaira et al. ("the '345 patent"). More particularly, the Action references Figure 15 of the '345 patent and alleges, *inter alia*, that this figure discloses that the dielectric film 15 is disposed over the lower electric sidewalls such that the film 15 conforms to the lower electrode sidewall and the oxidation barrier sidewall in a substantially straight line. Applicant respectfully disagrees.

The capacitive insulating layer 15 of the '345 patent (which the Action calls the dielectric film 15) while covering the lower electrode 13 on three sides, is not conformal to the lower electrode sidewall and the oxidation barrier sidewall, much less conformal to have a substantially straight line orientation over the lower electrode and barrier pattern sidewalls. The term "conformal" means at least has the general shape of or follows the shape of the underlying structure. In addition, the capacitive insulating layer 15 of the '345 patent shown in Figure 15 appears to be relatively thick (having the same thickness as that of the lower electrode) and does not appear to be a film.

For ease of reference, Applicant is restating Claim 1 hereat.

1. A semiconductor device comprising:
 - an interlayer dielectric layer disposed on a semiconductor substrate;
 - a buried contact plug extending a distance through the interlayer dielectric to be in electrical communication with a predetermined region of the semiconductor substrate;
 - an oxidation barrier pattern disposed on a top surface of the buried contact plug;

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a lower electrode disposed on the oxidation barrier pattern, wherein the lower electrode has a cross-sectional shape that includes spaced apart extending parts defining an inner cavity portion with a closed bottom surface and an upper portion therebetween, wherein a top surface area of the oxidation barrier pattern is substantially equal to a bottom surface area of the lower electrode, wherein the lower electrode includes an external sidewall and the oxidation barrier pattern includes a sidewall, and wherein the lower electrode external sidewall and the oxidation barrier pattern sidewall are aligned in a substantially straight line; and
a dielectric film disposed over the lower electrode sidewalls, wherein the dielectric film conforms to the lower electrode sidewall and the oxidation barrier sidewall in a substantially straight line orientation.

Applicant respectfully submits that the '345 patent fails to teach or suggest at least the emphasized features and that Claims 1-3 and 5-9 are patentable over the cited references for at least these reasons. Applicant also submits that Claims 2, 3 and 5-9 have independently patentable features, which for brevity are not discussed.

III. The §103 Rejections

The Action rejects Claims 36 and 37 as being obvious over the '345 patent in view of U.S. Patent No. 5,959,319 to Iwasa ("Iwasa") and in further view of U.S. Patent No. 6,118,144 to Kimura ("Kimura"). The Examiner alleges that "the use of cylindrically shaped electrodes is well known in the art" and cites Iwasa and Kimura in support of this position. Applicant again respectfully disagrees.

As noted by the Examiner, Iwasa states at col. 5, lines 34-43, that the storage node electrodes 10 can be formed in a three-dimensional shape, and includes the shapes of cubic structures, cylinders and fins. However, there is no enabling teaching of a method that can produce the claimed configuration, particularly as the referenced citation describes many other allegedly formable shapes. Kimura fails to remedy the deficiencies of the '345 patent or Kimura and Applicant submits that the passage noted by the Examiner only generally states that bigger electrodes are desirable. This does not address the space limitations nor the method to produce such a configuration. Still further, the '345 patent even combined with Iwasa or Kimura fails to teach or suggest the recitations of Claims 36 and 37 as noted below.

36. A semiconductor device according to Claim 1, wherein the lower electrode has a generally cylindrical shape with the closed bottom surface

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disposed on and coextensively with the oxidation barrier pattern, wherein the dielectric film defines a continuous surface between an upper electrode and the lower electrode and conformably resides against the surfaces defining the cavity of the lower electrode, and wherein a portion of the upper electrode fills the cavity of the lower electrode.

37. A semi-conductor device according to Claim 1, wherein, the spaced apart extending parts are configured as two substantially parallel spaced apart upwardly extending sidewalls.

Applicant respectfully submits that the claims are patentable for at least the emphasized recitations.

IV. Conclusion

In view of the foregoing, Applicant submits that the application is in condition is for allowance, which action is respectfully requested.

Respectfully submitted,

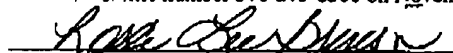


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